**Research Presentation: M6932**

**Carries weight of 10% towards overall grades.**

* This assignment is based on making a **research presentation** on an ATC related topic of your choice.
* You are required to submit/upload your **presentation** by 5th of March 9:00PM using the submission link, under Assignments, on the NTULearn course website. This file will be used for presentation and no further amendments will be allowed.
* Everyone will make a formal presentation during one session in the 12th week i.e. Wednesday 8th of April (6PM-9PM).
* You are expected to do a critical assessment/analysis of the presentation topic. Your analysis must involve examining and breaking information into component parts, determining how the parts relate to one another, identifying motives or causes, making inferences, and finding evidence to support generalizations. Synthesizing information which involves building a structure or pattern from diverse elements will be highly regarded.
* In your presentation, exhibits may be used and should contain specific units. A list of quality references must be included after Conclusion. Indicate the key articles or references (links) you have used and cited.

* Presentation: The presentation will be made within 10 minutes, followed by a Q & A session of 5 minutes.

Useful links:

* ATM Seminar, <http://www.atmseminarus.org/>
* ICRAT Conference, <http://www.icrat.org/icrat/>

1. **“Remote Tower Operations (RTO)”**

Describe the new emerging concept and the idea of Remote Tower Operations (TRO);

Analyse the benefits, challenges and opportunities of this concept;

Describe a possible future path from remote visual airport control to a virtual tower control;

Provide a first draft concept for a contingency concept for tower control of large airports.

1. **“4D-Trajectories in Air Traffic Control (ATC)”**

Analyse and describe the functionality of a 4D-Trajectory for aircraft operations;

Analyse and describe the functionality required on-board an aircraft (4D-FMS) or ATC;

Describe the benefits and potential benefits as well as possible disadvantages of 4D-trajectory operations

1. **“New Surveillance systems in ATC”**

Analyse and describe the (technical and operational) ‘pros and cons’ of current ATC surveillance systems based on RADAR (technically and operational usage).

Describe the functionalities of the new emerging technologies for ATC surveillance (choose one of: MLAT, ADS-B, AoS, etc.);

Discuss the potential operational benefits of these new technologies for the different phases of flight.

1. **“Functional Airspace Block South-East Asia (FABSEA)”**

Describe the potential benefit (and potential disadvantages) of functional airspace blocks (FAB);

Apply the idea of functional airspace blocks to South-East-Asia;

Develop a target scenario for optimizing air traffic flows for such a functional airspace block (Example: Functional Airspace Block South-East Asia FABSEA”).

1. **“A Survey on Air Traffic Flow Management”**

How ATFM works

General concept behind ATFM, various techniques that use in Europe, USA, Germany, etc… .

Deficiencies in current ATFM system: Issues and Challenges in ATFM

New emerging concepts of ATFM

In addition please focus on regional operational requirements on ATFM and maybe a Paragraph on how ATFM could be applied to South East Asia based on the regional operational requirements.

1. **“Next Generation Airborne Collision Avoidance Systems (ACAS-X)”**

Describe the technical advantages and deficiencies of current ACAS/TCAS II;

Describe and analyze the operational impact of current TCAS II systems;

Analyze and discuss the future need for airborne collisions avoidance systems based e.g. different dynamic behaviors of new airspace users (UAS/RPAS etc.) or other reasons (reduction of false alarm rate etc.);

Describe the principle functionality of the “Next Generation Airborne Collision Avoidance System ACAS-X”.

1. **“Integration of UAS in Urban Airspace (Urban Traffic Management - UTM)”**

Focus on the integration aspect of UAS (airtaxis, drones etc.) into urban airspace. Describe the necessary operational requirements and/or changes in order to allow such integration.

Develop a detailed plan for the integration using existing and/or alternative approaches especially focusing on a preliminary safety case.

1. **“Surface Management for Aircraft Taxiing at Airports”**

Being part of the planning function of the [Advanced Surface Movement Guidance and Control System](https://ext.eurocontrol.int/lexicon/index.php/Advanced_Surface_Movement_Guidance_and_Control_System) (A-SMGCS) determines the optimal surface movement plans (such as taxi route plans) involving the calculation and sequencing of movement events and optimising of resource usage (e.g. de-icing facilities). Please describe (based on scientific papers available from DLR, NASA, ATRiCS etc.) the operational needs for an assistance system for optimizing aircraft taxiing on airport surfaces, elaborate on the interaction with what is called Arrival Manager (AMAN) and Departure Manager (DMAN). Elaborate on the potential usage and application of robotic and Autonomous Algorithms into the development of SMAN technology in ATM.

1. **“Performance based radio navigation (PBN) used in Air Traffic Control”**

Today, radio navigation used in air traffic control (ATC) relies on ground based radio navigation systems (NDB/VOR/DME/ILS) as well as the use of satellite navigation (GNSS/GPS/GALILEO etc.). The combined use of both today is named Performance Based Navigation (PBN). Please describe the technical as well as operational requirements for PBN and discuss limitations, challenges and possible future improvements for PBN

1. **“Operational use of ADS-B over Satellite in air traffic control”**

The use of the new ADS-B Extended Squitter (SSR-Mode-S DF-17) is constantly growing worldwide. Technically, it’s reception is limited to radio-line-of-sight only. Therefore, a new era of potential usage will come up with the ability to receive such signals anywhere around the globe by using low earth orbit satellites for reception. Based on such a system please describe the technical requirements and potential operational benefits.